

Application No. 10/828,637
Docket No. 14374.54
Reply to Office Action mailed November 1, 2005

AMENDMENTS TO THE CLAIMS

Please cancel claims 1-2, 12-14, 18-24 and 26-29, amend claims 3-11, 16-17 and 25, and add new claims 30-33. No new matter is believed to be introduced by the aforementioned amendments and new claims. The following listing of claims will replace all prior versions and listings of claims in the application.

1. - 2. (Canceled)

3. (Currently amended) ~~The x-ray tube as recited in Claim 2, An x-ray tube comprising:~~
(a) a vacuum enclosure;
(b) a filament and a cathode cup including two walls which cooperate to at least partially define a slot wherein the filament is at least partially disposed, a distance between the filament and the at least one wall varying along at least a portion of the longitudinal length of the filament, and wherein the distance between said filament and at least one of the at least two walls [[is]] being at a minimum proximate a middle portion of the filament; and
(c) an anode positioned within the vacuum enclosure so as receive electrons emitted by the filament.

4. (Currently amended) The x-ray tube as recited in Claim [[2]] 3, wherein the distance between the filament and at least one of the at least two walls is at a maximum proximate at least one end portion of the filament.

5. (Currently amended) The x-ray tube as recited in Claim [[2]] 3, wherein the at least two walls of the slot are of substantially the same shape and are symmetrically disposed with respect to the filament.

6. (Currently amended) An x-ray tube as defined in Claim [[2]] 3, wherein the slot further comprises a bottom surface, and wherein the at least two walls are perpendicularly disposed with respect to the bottom surface.

7. (Currently amended) The x-ray tube as recited in Claim [[2]] 3, wherein the slot defines a cross-section having at least two different widths.

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8. (Currently amended) The x-ray tube as recited in Claim ~~[[2]]~~ 3, wherein the ~~means for emitting electrons according to a predetermined emission profile comprises a filament~~ is configured such that at least one of the properties of the filament varies along at least a portion of a longitudinal length of the filament, wherein the properties of the filament are selected from the group consisting of: filament wire diameter, pitch, filament diameter.

9. (Currently amended) The x-ray tube as recited in Claim ~~[[2]]~~ 3, wherein the ~~means for emitting electrons according to a predetermined emission profile comprises a cathode cup including two wells which cooperate to at least partially define a slot, the slot~~ ~~[[having]]~~ has a cross sectional area that varies along at least a portion of a length of the slot.

10. (Currently amended) The x-ray tube as recited in claim ~~[[1]]~~ 3, wherein the ~~means for emitting electrons according to a predetermined emission profile produces~~ an emission profile associated with the filament is such that ~~[[wherein]]~~ a density of emitted electrons per unit area is substantially uniform throughout a predefined plane through which a substantial portion of the emitted electrons pass.

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11. (Currently amended) A cathode assembly suitable for use in an x-ray device, the cathode assembly comprising:

- (a) a base portion;
- (b) a cathode cup attached to the base portion, the cathode cup including at least two walls which cooperate to at least partially define a slot; and
- (c) a filament disposed substantially within the slot, the filament taking one of the following forms:

a helically wound wire configured such that a diameter of the filament varies along a longitudinal axis defined by the filament, the variances in diameter being substantially symmetrically arranged with respect to a predetermined location on the longitudinal axis;

a helically wound wire whose pitch varies along a longitudinal axis defined by the filament, the variances in pitch being substantially symmetrically arranged with respect to a predetermined location on the longitudinal axis; and

a helically wound wire whose diameter varies along a longitudinal axis defined by the filament, the variances in diameter being substantially symmetrically arranged with respect to a predetermined location on the longitudinal axis.

12. -- 14. (Canceled)

15. (Original) The cathode assembly as recited in claim 11, wherein the slot at least partially defined by the walls of the cathode cup has a cross sectional area that varies along at least a portion of a length of the slot.

16. (Currently amended) The cathode assembly as recited in claim 11, wherein the slot at least partially defined by the walls of the cathode cup has a cross sectional area that varies along at least a portion of a length of the slot; ~~and wherein at least one of the properties of the filament varies along at least a portion of a longitudinal length of the filament, the properties of the filament being selected from the group consisting of: filament wire diameter, pitch, filament diameter.~~

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17. **(Currently amended)** In an x-ray tube having a filament of predetermined longitudinal length, a method for producing an electron stream having a predetermined electron density profile, the method comprising:

- (a) applying a predetermined electric current to the filament so as to cause emission of electrons by the filament;
- (b) varying, with respect to the longitudinal length of the filament, the rate at which electrons are emitted by the filament, the varying of the rate at which electrons are emitted by the filament being implemented by performing one of:

varying an electrical field strength in selected areas proximate the filament;

and

heating the filament in such a way that some portions of the filament are at a relatively higher temperature than other portions of the filament; and

- (c) accelerating at least some of the emitted electrons toward a focal spot located at a predetermined distance from the filament.

18. - 24. **(Canceled)**

25. **(Original)** ~~The filament as recited in Claim 23, wherein A filament, comprising:~~

- (a) a wire wound into successive coils to form a helix, the helix comprising a middle portion and first and second end portions, wherein at least one of a group of properties varies along at least a portion of a longitudinal length of the filament, the group of properties consisting of: wire diameter, pitch, filament diameter and wherein the wire diameter is greatest in the middle portion of the helix; and

- (b) first and second electrical leads, the first electrical lead being attached to the first end portion of the helix, and the second electrical lead being attached to the second end portion of the helix.

26. - 29. **(Canceled)**

30. **(New)** The x-ray tube as recited in claim 3, wherein the filament defines a plurality of pitches.

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31. (New) The x-ray tube as recited in claim 3, wherein the slot has first and second ends, the slot being wider at the first end than at the second end.

32. (New) The x-ray tube as recited in claim 3, wherein the slot has first and second ends, the slot having substantially the same width at the first and second ends.

33. (New) The cathode assembly as recited in claim 11, wherein the predetermined location comprises a location proximate a center of the filament.